

**Report 10976A  
7 December 1998**

**Earth Observing System (EOS)  
Advanced Microwave Sounding Unit-A  
(EOS/AMSU-A)  
Firmware Version Description Document**

**Contract No: NAS5-32314  
CDRL 306-8b**

**Submitted to:**

**National Aeronautics and Space Administration  
Goddard Space Flight Center  
Greenbelt, Maryland 20771**

**Submitted by:**

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## **SECTION 1**

### **INTRODUCTION**

#### **1.1 IDENTIFICATION**

This is the *Firmware Version Description Document* for the firmware to be used in the Earth Observing System (EOS) Advanced Microwave Sounding Unit-A (AMSU-A) instrument. This document is submitted in response to Contract NAS 5-32314 as a part of Contract Data Requirements List (CDRL) 306, Software Product Specifications. CDRL 306 is further broken down into subsets of which this document is identified as CDRL 306-8b. (CDRL 306-8a is the companion "Software Version Description document.") Refer to Figure 1 for the software documentation tree.

#### **1.2 SCOPE**

This document defines the current firmware version of all four Computer Software Configuration Items (CSCI) for the EOS/AMSU-A instrument.

#### **1.3 PURPOSE AND OBJECTIVES**

The purpose of the *Firmware Version Description Document* is to provide a precise description of the particular version of the firmware being released. This description also defines the version of the requirements and design applicable to this version.

#### **1.4 DOCUMENT STATUS AND SCHEDULE**

This is the final submittal of the EOS/AMSU-A *Firmware Version Description Document*.

#### **1.5 DOCUMENT ORGANIZATION**

The EOS/AMSU-A Software Documentation Tree is as shown in Figure 1.

Document	Doc. No.	CDRL No.
<b>Software Management Plan</b>	<b>10339</b>	<b>008</b>
Acquisition Activities Plan	10341	508
Software Standards and Procedures	---	402
Software Assurance Plan	10428	309
Configuration Management Plan	9803	005
<b>Software Product Specifications</b>	<b>---</b>	<b>306</b>
Software Concept Document	10432	306-1a
Software Requirements Specification	10457	306-2a
Software Architectural Design	10464	306-3a
Software Detailed Design Document	10463	306-5a
Firmware Support Manual	10466	306-7
Version Description Document	10467	306-8a
User's Guide	10443	306-10a
<b>Firmware Product Specification</b>	<b>---</b>	<b>306</b>
Firmware Concept Document	10436	306-1b
Firmware Requirements	10458	306-2b
Firmware Architectural Design	10460	306-3b
Firmware Detail Design Document	10387	306-5b
<i>Firmware Version Description</i>	10976	306-8b
<b>Software/Firmware Test Plan</b>	<b>10369/10352</b>	<b>033</b>
Software Test Procedures	AE-26602	415
Software Test Reports	10975	217
Firmware Test Procedures	AE-26600	415
Firmware Test Reports	10974	217

Figure 1. EOS/AMSU-A Software Documentation Tree

## **SECTION 2**

### **RELATED DOCUMENTATION**

#### **2.1 PARENT DOCUMENTS**

See Figure 1.

#### **2.2 APPLICABLE DOCUMENTS**

The following documents are referenced or applicable to this test report. Unless otherwise specified, the latest issue is in effect.

##### **NATIONAL AERONAUTICS And SPACE ADMINISTRATION**

NASA-DID-P500	Version Description Data Item Description
GSFC 422-10-04	Earth Observing System (EOS) Instrument Project Software Acquisition Management Plan
422-11-12-01	General Interface Requirements Document (GIRD)

(Copies of NASA documents should be obtained from the NASA Scientific and Technical Information Facility, P.O. Box 8757, BWI Airport, Baltimore, MD 21240.)

##### **AEROJET DOCUMENTS**

Report 10458 July 1994	Earth Observing System/Advanced Microwave Sounding Unit-A (EOS/AMSU-A) Firmware Requirements
Report 10387 25 April 1996	Earth Observing System/Advanced Microwave Sounding Unit-A (EOS/AMSU-A) Firmware Detail Design

#### **2.3 INFORMATION DOCUMENTS**

Report 10345	EOS/AMSU-A Project Plan, Including Project Organization Chart, WBS Diagram, and Task Description
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(Copies of Aerojet documents should be obtained from Aerojet, CAGE 70143, P.O. Box 296, Azusa, California 91702-0296.)

### SECTION 3

#### PRODUCT DESCRIPTION

This document describes the original release of the four CSCI's that represent the flight firmware for the EOS/AMSU-A1 and A2 instruments. The CSCI names and descriptions are as follows:

CSCI #	Firmware Description
N7	EOS/AMSU-A1 Instrument Control Firmware
N8	EOS/AMSU-A1 Command and Data Handling Firmware
N11	EOS/AMSU-A2 Instrument Control Firmware
N12	EOS/AMSU-A2 Command and Data Handling Firmware

The requirements for these CSCI's are defined in Aerojet Report 10458, dated July 1994, CDRL 306-2b. The detailed designs are defined in Aerojet Report 10387, dated 25 April 1996, CDRL 306-5b.

## SECTION 4

### INVENTORY AND PRODUCT

#### 4.1 MATERIALS RELEASED

The tests demonstrated that the Command and Data Handling CSCI's N8 and N12 met all the requirements specified in the NASA General Interface Requirements Document (GIRD) together with the revised packetization requirements for the EOS/AMSU-A1 data. The functionality of the requirements were demonstrated. The verification of the requirements will take place during the initial Instrument Comprehensive Performance Test (CPT).

- a. There are two media items submitted for this firmware:
  - 1. A Tape Data Cartridge written in a UNIX format on an HP64000 development system computer containing all source, listing, object, and executable files for all four CSCI's. Dated March 1997.
  - 2. A "floppy" disk containing the listing files for all four CSCI's in an ASCII personal computer (PC) compatible format. Dated March 1997.
- b. The only operation and support document relevant to these CSCI's is the Firmware Support Manual, Aerojet Report 10466, dated February 1995, CDRL 306-7.
- c. All utility and support software and equipment that are not a part of this version but are required to load and maintain this version reside in the Aerojet HP Development System and are not part of the deliverable software.
- d. The required hardware is the HP6400 Development System and an appropriate Programmable Read Only Memory (PROM) burner.

#### 4.2 PRODUCT CONTENT

This is the final release of each of the four CSCI's. The listings of each are included on the delivered "floppy" disk. The baseline source, object, and executable versions of these CSCI's were recorded on magnetic tape and bonded by Aerojet Quality Assurance and reside in the AMSU-A Quality Bond area.

Version descriptions of all the Computer Software Components (CSC) which make up these CSCI's are not included herein since the CSC's cannot be separately assembled and are not maintained as separate entities.

## SECTION 5

### CHANGE STATUS

The following changes were made to the respective CSCI's since the initial release of this Version Description Document.

CSCI No.	ECN No.	Release Date	Description of Change	Justification of Change
N7	1535	10-8-97	1) Change all references in software from INOG to PORTB. 2) Change sequence of channels in table TMA to match hardware. 3) Change all antenna position lookup tables to match hardware.	Software must be modified to match as-built hardware configuration.
N8	1713	3-3-98	1) Delete requirement for software to call command processing routine only at the eighth second of the eight-second scan.	This requirement is unnecessarily restrictive and causes commands to be missed. Allowing commands to be processed at any time during the scan is a proper method.
N11	1534	10-8-97	1) Change all references in software from INOG to PORTB. 2) Change sequence of channels in table TMA to match hardware. 3) Change all antenna position lookup tables to match hardware.	Software must be modified to match as-built hardware configuration.
N11	1744	3-24-98	1) Correct the instrument serial number to #4. 2) Widen the instrument position tolerance from 11 to 50 counts.	Must include correct serial number (GIRD requirement 8.3.1). Widen position tolerance to prevent flight software from determining whether a position error exists.
N11	1750	3-31-98	1) Modify beam position #1 data from 7D8C to 7DA4.	Match software to instrument hardware motor detent for position 1.
N12	1712	3-3-98	1) Delete requirement for software to call command processing routine only at the eighth second of the eight-second scan.	This requirement is unnecessarily restrictive and causes commands to be missed. Allowing commands to be processed at any time during the scan is a proper method.
N12	1743	3-24-98	1) Correct the packet length as included in the CSSDS Header (length was short by 6 octets).	Header must be correct for proper ground processing (GIRD requirement figure 6-4).

## **SECTION 6**

### **ABBREVIATIONS AND ACRONYMS**

AMSU-A	Advanced Microwave Sounding Unit-A
BWI	Baltimore-Washington International
CDRL	Contract Data Requirements List
CPT	Comprehensive Performance Test
CSC	Computer Software Component
CSCI	Computer Software Configuration Item
ECN	Engineering Change Notice
EOS	Earth Observing System
GIRD	General Interface Requirements Document
ID	Identification
MIL-STD	Military Standard
NASA	National Aeronautics and Space Administration
PC	Personal Computer
PROM	Programmable Read Only Memory
WBS	Work Breakdown Structure

**SECTION 7**


**GLOSSARY**

**SECTION 8**

**NOTES**

**SECTION 9**

**APPENDICES**

 <b>NASA</b> National Aeronautics and Space Administration		Report Documentation Page	
1. Report No. ---	2. Government Accession No. ---	3. Recipient's Catalog No. ---	
4. Title and Subtitle  Integrated Advanced Microwave Sounding Unit-A, Firmware Version Description Document		5. Report Date <b>7 December 1998</b>	
		6. Performing Organization Code ---	
7. Author(s)  A. Cisneros		8. Performing Organization Report No. <b>10976A</b>	
		10. Work Unit No. ---	
9. Performing Organization Name and Address Aerojet 1100 W. Hollyvale Azusa, CA 91702		11. Contract or Grant No. <b>NAS 5-32314</b>	
		13. Type of Report and Period Covered <b>Final</b>	
12. Sponsoring Agency Name and Address NASA Goddard Space Flight Center Greenbelt, Maryland 20771		14. Sponsoring Agency Code ---	
15. Supplementary Notes  ---			
16. ABSTRACT (Maximum 200 words )  This is the Firmware Version Description Document for the Integrated Advanced Microwave Sounding Unit-A (AMSU-A).			
17. Key Words (Suggested by Author(s))  EOS Microwave System		18. Distribution Statement  Unclassified --- Unlimited	
19. Security Classif. (of this report)  Unclassified	20. Security Classif. (of this page)  Unclassified	21. No. of pages	22. Price  ---

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6. AUTHOR(S) <b>A. Cisneros</b>				
7. PERFORMING ORGANIZATION NAME(S) AND ADDRESS(ES) <b>Aerojet 1100 W. Hollyvale Azusa, CA 91702</b>			8. PERFORMING ORGANIZATION REPORT NUMBER <b>10976A 7 December 1998</b>	
9. SPONSORING/MONITORING AGENCY NAME(S) AND ADDRESS(ES) <b>NASA Goddard Space Flight Center Greenbelt, Maryland 20771</b>			10. SPONSORING/MONITORING AGENCY REPORT NUMBER <b>---</b>	
11. SUPPLEMENTARY NOTES  <b>---</b>				
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